ANNOUNCEMENT was made at a meeting of the Yale Corporation on January 19 that gifts and pledges of $350,000 had been obtained for the development of the Yale Divinity School into a university school of religion. These gifts will increase the endowment of the school to over $1,200,000. Among the gifts were $100,000 from Mrs. D. Willis James and Arthur Curtiss James, of New Haven; $80,000 from Mrs. Stephen Merrell Clement, of Buffalo, N. Y., and an anonymous gift of $100,000, the latter to found a chair of social service.

THE trustees of Vassar College have announced that as President Taylor's resignation, which he presented a year ago, is to take effect February 1, in accordance with his wishes, and as no new president has been appointed, the administration of the college will be carried on by committees of trustees and faculty. Professor Herbert E. Mills, head of the department of economics, will act as chairman of the faculty.

ON January 9 and 10 occurred the first annual convention of the Stevens Institute of Technology. The convention opened with a symposium on "An Engineer's Part in the Regulation of Public Utilities." President Humphreys acted as chairman of the meeting, and papers were read by him and by several other Stevens alumni. Other features of the convention were the midwinter alumni meeting, a conference of Stevens Clubs, a trip to the Brooklyn Navy Yard and the alumni dinner at the Hotel Astor.

DR. E. A. FATH, director of Beloit College Observatory, has resigned his position to accept the presidency of Redfield College of Redfield, S. D. He will take up his new work about March 1.

DR. HENRY WINSTON HARPER, professor of chemistry in the University of Texas, Austin, has been made dean of the graduate department.

DR. CREIGHTON WELLMAN, dean of the school of hygiene and tropical medicine of the Tulane University of Louisiana, has resigned this position.

PROFESSOR F. L. STEVENS has resigned the position of dean of the College of Agriculture, Mayaguez, Porto Rico, to become professor of plant pathology in the University of Illinois.

DR. WILLIAM DUANE has been appointed assistant professor of physics in Harvard University. He has spent six years in the Curie Radium Laboratory at Paris, and last fall returned to this country as research fellow of the cancer commission of Harvard University. Professor Duane will devote the greater part of his time to the physiological action of radioactive substances and to the problems in physics directly conected with this subject at the Harvard Medical School and at the Huntington Cancer Hospital, but he will also undertake the direction of advanced students in problems on the purely physical side of radioactivity in the Jefferson Physical Laboratory.

DR. H. F. BAKER, F.R.S., fellow and lecturer of St. John's College, and Cayley university lecturer in mathematics, has been elected Lowndean professor of astronomy and geometry at the University of Cambridge in succession to the late Sir Robert Ball.

DISCUSSION AND CORRESPONDENCE

TUBERCULOSIS FOLLOWING TYPHOID FEVER

IN SCIENCE for 1908, Professor W. T. Sedgwick, of the Massachusetts Institute of Technology, called attention to the remarkable discovery by Reincke, of Hamburg, and Mills, of the United States, that when an infected water supply of a community was improved by filtration or otherwise, not only did typhoid fever diminish, but other diseases also, such as tuberculosis. Hazen calculated that for every typhoid death prevented, two or three were saved from death by other diseases. Sedgwick and MacNutt subsequently published their full paper in the *Journal of Infectious Diseases,* and the former in still another paper in a symposium on "Tuberculosis in Massachusetts," 1908, stated that as a rule infected waters increased the death rate from tuberculosis and purification of water decreased the rate.

For some time I have been collecting data which enable us to extend these generalizations still further. It has been found that tuberculosis follows typhoid fever far more frequently than physicians have suspected, and moreover the tuberculosis mortality curve of a nation is almost always parallel to that of typhoid fever. Cities do not show such a close agreement as the country as a whole, because consumptives quite commonly leave the city to die elsewhere. As far as the very defective statistics permit a conclusion, it is to the effect that consumptives have had much more typhoid fever than the rest of the population. We have long known of the serious after effects of typhoid fever, but only recently have a few physicians been calling attention to the far-reaching nature of these sequelæ. Tuberculosis is only one of these results. That is, by reducing typhoid fever in any way whatever we save far more from death by numerous other conditions due to the lessened resistance caused by the typhoid infection. The purification of a water supply is then only one of the numerous ways of reducing tuberculosis.

The explanation of the phenomenon is evident. By personal inquiries of physicians in the United States, Germany, Switzerland, France and Great Britain, I find that the following facts seem proved to the minds of those who by special study are competent to form an opinion. Babies are born free of tuberculosis, but begin to acquire it as soon as they can crawl around, pick up the bacilli with dust and dirt, and immediately convey them to the mouth after the manner of all babies. These germs are weakened or attenuated by sunlight, drying, etc., and are not able to spread actively, though they establish themselves. Those which are taken in by the phagocytes have the same effect as vaccination and cause the production of antibodies which make us all more or less immune to infection by virulent bacilli. If a baby is infected by fresh virulent bacilli from a nurse, before its immunity is produced, it dies of rapid disseminated tuberculosis, but an adult is not harmed by the virulent bacilli he takes in. Indeed, there is no incontrovertible evidence that any adult ever acquires tuberculosis. If one develops active tuberculosis, it is not a new infection, but an activation of latent lesions he has been carrying since childhood. Something has happened to him which has caused a temporary lessening of his antibodies and allowed the latent tuberculosis to spread—and nothing is more potent in doing this than the infections like measles, whooping cough and typhoid fever. Without these activating causes a man may lose immunity very slowly by improper food, mental and physical exhaustion, living in badly ventilated rooms, lack of outdoor exercise and a thousand other ways of lowering general health, but if one in such a condition does acquire another infection like pneumonia, typhoid fever or influenza, his chances of becoming actively tubercular later are very large. Post-mortems of children almost always reveal tubercle, no matter what the disease was which caused death. Post-mortems of adults always show healed lesions, proving that at some time in our lives each of us lost resistance sufficiently to allow the lesions to become active, though we were later cured by a reestablishment of the immunity. One eighth or one tenth of us are unable to reestablish it and perish from tuberculosis. The facts are bound to modify the anti-tuberculosis crusade most profoundly.

Savages, living an outdoor isolated life, have no chance to encounter tubercle bacilli and consequently do not become immune. When they do come in contact with a case they run a rapidly fatal course—generally if not always disseminated or miliary. That is, tuberculosis did not become a human affliction until long after we began to cluster together in confined shelters—possibly not until after we began to construct huts, "dugouts" and houses.

The detailed data which prove the relationship of tuberculosis and typhoid fever will appear in *American Medicine* in January, but this preliminary note is published as an answer to the questions of Hazen and Sedgwick as to how we could explain the phenomenon of a decrease of tuberculosis by the

simple expedient of purifying the water supply.

CHARLES E. WOODRUFF

SCIENTIFIC BOOKS

Lectures on the Differential Geometry of Curves and Surfaces. By A. R. FORSYTH. University Press, Cambridge, 1912. Large octavo. Pp. xxiii + 585. Price, $8.

Professor Forsyth's skill and versatility in the writing of mathematical treatises, already proved by his well-known works on differential equations and the theory of functions, is again illustrated by this new volume, his first in the field of geometry. The lectures were delivered, in substantially their present form, during the author's tenure of the Sadlerian professorship at Cambridge. They make very interesting reading. The style is graceful, and the technical discussions are illuminated by many passages on the history and development of the special topics considered.

Naturally no attempt is made to cover the whole field of differential geometry. Not even the classic four-volume treatise of Darboux pretends to include all the applications of the methods of the infinitesimal calculus to the domain of geometry. In particular, the author omits all extensions to hyperspace and non-Euclidean geometrics. His main aim is to "expound those elements with which eager and enterprising students should become acquainted," and to provide such students, who, later, may devote themselves to original work "with some of the instruments of research."

The author restricts himself to curves and surfaces in ordinary Euclidean space and uses the direct methods introduced by Gauss. "I have made no attempt to give what could only have been a rather faint reproduction of Darboux's treatment, which centers round the tri-rectangular trihedron at any point of a curve or surface or system. My hope is that students may experience an added stimulus when they find that different methods combine in the development of growing knowledge." It must be admitted that, by showing the power of the more natural methods (combined, of course, with typical Cambridge skill in analytical manipulation) in the solution of extremely difficult problems, the author's procedure is amply justified.

As regards logical rigor the work is about on a level with the texts of Bianchi, Scheffers, and Eisenhart. No attempt is made to lay precise function-theoretic foundations for the geometric structure which is erected. In particular the concepts of analytic curve and surface, employed throughout the work, are never formulated precisely. Professor Study's vigorous criticism of the new edition of Bianchi in this aspect applies in fact to all standard treatises on differential geometry. It must be confessed that the claims of rigor are not emphasized in geometry to nearly the same extent as in analysis. In this respect geometry in fact occupies a position between analysis and physics, and to that extent belongs to applied rather than to pure mathematics. Study has himself outlined a proper basis for the treatment of analytic curves,[1] but this has not yet been digested into a form suitable for an introductory text, and the corresponding discussion of surfaces is still to be undertaken. No doubt, in the future—how near one can not say—Study's high and beautiful ideal will become realized. Meanwhile, most geometers, at least when they write on differential geometry, follow the older and what they considered the most expedient approach. Perhaps a distinction should be made, even in the domain of graduate mathematics, between *pedagogic* books and *logical* books. The evolution toward a rigorous treatment (never perfect, but at least up to the highest standard of a given period of mathematics) is obviously inevitable.

As regards the introduction of *imaginary* configurations in geometry the author follows the traditional half-hearted policy of considering them only when it is convenient, or at least traditional, to do so. Thus, in connection with a real surface, it is analytically expedient to introduce certain curves, of course imaginary, whose length (between any two points) is zero. [These the author desig-

[1] In two memoirs published in the *Trans. Amer. Math. Soc.*, 1909, 1910.